

CLAIMS

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- 1 1. A transistor comprising:
- 2 a substrate;
- 3 a defined channel region;
- 4 a floating gate generally disposed over said channel region separated therefrom by a
- 5 first insulating layer;
- 6 a control gate generally placed on one side of said floating gate separated therefrom by a
- 7 second insulation layer;
- 8 an erase gate generally placed on a second side of said floating gate separated therefrom
- 9 by said second insulation layer;
- 10 a drain region generally disposed on a first side of said floating gate; and
- 11 a source region generally disposed on a second side of said floating gate.

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- 1 2. A transistor as recited in claim 1 wherein said erase gate overlaps said floating gate and
- 2 said control gate.

- 1 3. A method for fabricating a transistor, comprising the steps of:
- 2 a) providing a substrate;
- 3 b) defining a channel region;
- 4 c) growing field oxide in defined areas;
- 5 d) providing a first insulating layer;
- 6 e) depositing a first poly-silicon layer;

- 7 f) defining from said first poly-silicon layer a floating gate generally positioned
8 over said channel region;
- 9 g) doping a source region;
- 10 h) providing a second insulating layer;
- 11 i) depositing a second poly-silicon layer;
- 12 j) defining a control gate and an erase gate; and
- 13 k) doping a drain region.

1 4. A method as recited in claim 3 wherein said control gate is generally positioned on a
2 first side of said floating gate and overlapping said floating gate.

1 5. A method as recited in claim 3 wherein said erase gate is generally positioned on a
2 second side of said floating gate and overlapping said floating gate.

1 6. A method as recited in claim 5 wherein said erase gate is generally positioned on said
2 second side of said floating gate and overlapping said floating gate and said control gate.

1 7. A method as recited in claim 5 wherein said erase gate is generally positioned on said
2 second side of said floating gate and overlapping said floating gate and about flush with said
3 control gate.

1 8. A memory array comprising a plurality of memory cells each having a floating gate, an
2 erase gate, a control gate, a source region, and a drain region comprising:

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3 a plurality of rows and columns of interconnected memory cells wherein the control
4 gates of memory cells in the same row are connected by a common word-line, the erase gates of
5 the memory cells in the same rows are connected by a common erase line, and the source
6 regions of the memory cells in the same rows are connected by a common source line, and the
7 drain regions of memory cells in the same columns are commonly connected via a common
8 drain line; and
9 control circuit connecting to said word-lines, erase lines, source lines and drain lines for
10 operating one or more memory cells of said memory array.

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1 9. A memory array as recited in claim 8 wherein each of said memory cells comprising: a
2 substrate, a defined channel region, a floating gate generally disposed over said channel region
3 separated therefrom by a first insulating layer, a control gate generally placed on one side of
4 said floating gate separated therefrom by a second insulation layer, an erase gate generally
5 placed on a second side of said floating gate separated therefrom by said second insulation
6 layer, a drain region generally disposed on a first side of said floating gate, and a source region
7 generally disposed on a second side of said floating gate.

1 10. A memory array as recited in claim 9 wherein said erase gate overlaps said floating gate
2 and said control gate.

1 11. A method for fabricating a memory array comprising a plurality of rows and columns of
2 interconnected memory cells wherein the control gates of memory cells in the same rows are
3 connected by a common word-line and the erase gates of the memory cells in the same columns

4 are connected by a common erase line, and the source regions of memory cells in the same
5 rows are connected by a common source line, and drain regions of memory cells in the same
6 columns are connected by a common drain lines, comprising the steps of :

- 7 a) providing a substrate;
- 8 b) defining a channel region;
- 9 c) growing field oxide in defined areas;
- 10 d) providing a first insulating layer;
- 11 e) depositing a first poly-silicon layer;
- 12 f) defining from said first poly-silicon layer a floating gate generally positioned
13 over said channel region;
- 14 g) doping a source region;
- 15 h) providing a second insulating layer;
- 16 i) depositing a second poly-silicon layer;
- 17 j) defining a control gate and an erase gate; and
- 18 k) doping a drain region.

1 12. A method as recited in claim 11 wherein said control gate is generally positioned on a
2 first side of said floating gate and overlapping said floating gate.

1 13. A method as recited in claim 11 wherein said erase gate is generally positioned on a
2 second side of said floating gate and overlapping said floating gate.

1 14. A method as recited in claim 13 wherein said erase gate is generally positioned on said
2 second side of said floating gate and overlapping said floating gate and said control gate.

1 15. A method as recited in claim 13 wherein said erase gate is generally positioned on said
2 second side of said floating gate and overlapping said floating gate and about flush with said
3 control gate.

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